Space Weather Forecast

Issued on Saturday, 12 March 2022 at 01:11 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Geomagnetic activity expected to increase days 2 and 3, with a G1/Minor geomagnetic storm likely. Chance of further Moderate class flares

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with an moderate class flare at 11/2232 UTC and several common class flares observed. These originating mostly from a sunspot in the northeast and one in the southwest. The long period common class flare from 10th March emitted a large and wide, full halo coronal mas ejection, which is expected to hit Earth either late on 13th March or early on 14th March. Further imagery is necessary before any ejecta can be identified from the moderate class flare from late on 11th.

There are five sunspot regions on the visible disc, the two regions mentioned above are the most magnetically complex. There is one other large but stable region and several small and simple spots/pores on the visible facing side of the sun.

There are also numerous - mostly small - filaments on the disc at present. The largest of these lifted off the southeastern limb late in the UTC evening of 09 March, with the resultant Coronal Mass Ejection clearly discernible in coronagraphs. A marginal influence is possible at Earth from at least the shock either late 13th March or more likely through 14th March.

Solar Wind / Geomagnetic Activity: The solar wind, was mostly at background levels initially, rising to slightly elevated from 11/0800 UTC. The interplanetary magnetic field was largely Moderate, with the north-south component flutuating wildly between weak and moderate throughout and in both positive and negative directions. These parameter fluctuations are implicit of the after effects of the CME arrivals from the 5th and 7th March. Geomagnetic activity was initially Active (Kp 4) but gradually became Quiet to Unsettled (Kp 2-3).

Energetic Particles / Solar Radiation: No solar radiation storms were observed, although the energetic particles did display a slight increase above background early on 11th March as a result of the CME that was emitted the previous day.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be Low to Moderate, with further Common class flares expected and a chance of further Moderate class flares. The risk being distributed between the two most complex sunspot regions in the nothwets and southeast, though the risk of Moderate class flares will reduce from day 3 as the region in the southwest rotates off the visible disk.

Solar Wind / Geomagnetic Activity: There are two potentially Earth-directed coronal mass ejections in the forecast. The first is from the 9th March. This may influence Earth either late day 2 (13th) or through day 3 (14th). Yesterday's large full halo coronal mass ejection is also expected to arrive either late on day 2 (13th) or early on day 3 (14th), and will probably be a larger impact than the 9th March coronal mass ejection. Meanwhile, high speed stream influence from a coronal hole may arrive during day 2 (13th), although this is likely to be absorbed by the

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large coronal mass ejection.

Geomagnetic activity is expected to trend back to mostly Quiet or Unsettled (Kp1-3) conditions, with a slight chance of further Active or G1/Minor Storm intervals. During day 2 (13th) activity is likely to increase, becoming generally Unsettled to Active, with likely G1/Minor (Kp 5) Storms intervals late on day 2 or during day 3 (13th or 14th), with a Chance of a G2/Moderate (Kp 6) Storm interval.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, with energetic particles expected to remain predominantly at Background levels, albeit with a very slight chance of rising above-the S1 level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	70	60	10
Strong	G3	No	1	2	2	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	20	20
Very Active	R3 to R5 X	No	2	2	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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